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BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

NEWS LETTER

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FRUIT INSECT INVESTIGATIONS

Raisin moth and grape spoilage.--A survey of infestation and decay of grapes was made in July, August, and September by George H. Kaloostian, of the Fresno, Calif., laboratory. The total number of bunches examined was 4,974, of which 696 had been damaged. The injuries found were classified as follows: Rot alone, 20.3 percent; rot followed by secondary infestation by *Drosophila* and nitidulid beetles, 64.8 percent; rot and infestation by the raisin moth (*Ephestia figulilella* Greg.), 6.6 percent; rot and infestation by the grape leaf folder (*Desmia funeralis* (Hbn.)), 0.3 percent; infestation alone, by the raisin moth, 8.0 percent. The raisin moth occurred in 14.6 percent of the damaged clusters and in about 2 percent of the total number examined. As nearly as could be judged, the primary causes of spoilage were: Crushing and cracking of berries during growth, 86 percent; insects (practically all raisin moth), 12 percent; and birds, 2 percent.

Procedure for tests of Japanese beetle insecticides or repellents.--In order to develop a method for evaluating under field conditions materials that offer promise as Japanese beetle repellents, a new type of experimental set-up was tested in the summer of 1940 by W. E. Fleming, E. D. Burgess, and W. W. Maines, of the Moorestown, N. J., laboratory. Because of the localized nature of feeding by the Japanese beetle, and the fact that most materials that give protection act chiefly as repellents, field experimentation in established plantings does not always give dependable results. It is, however, essential to determine the performance under actual field conditions of materials that have shown initial toxicity or repellency under controlled laboratory conditions. An additional reason for field experimentation in certain cases is a recent decision of the United States Court of Customs and Patent Appeals, in Interference Case 71,407 (see Bureau News Letter v. VII, No. 8, August 1, 1940, p. 37). In the opinion of this court, an invention concerning the insecticidal use of any material is not reduced to practice until it has been tested under conditions in which the insect is naturally found. For use in these field experiments 25 tubs of smartweed were prepared, with 5 plants per tub. The plants had been fertilized with a nutrient solution and were vigorous and uniform in size. The plants in 5 of the tubs were unsprayed, those in 5 were sprayed with 6 pounds of lead arsenate (acid) and 1.5 pints of linseed oil per 100 gallons of water, and those in the remainder were sprayed with materials A, B, or C. The tubs were arranged about 4 feet apart in the form of a Latin square on a farm near Holmdel, N. J., where the Japanese beetles were abundant. After 1 week the tubs were brought to the laboratory and for the plants in each tub the numbers of leaves completely consumed by the beetles were determined. The average number of leaves eaten by the beetles on the plants receiving different treatments, and the percentage reductions in feeding, as oompared with that on unsprayed foliage, are given in the following table.

Treatment	Average leaves eaten	Reduction in feeding
	Number	Percent
Unsprayed plants----	133.8	----
Lead arsenate-------	6.0	95.5
Spray A-------------	70.6	47.2
Spray B-------------	73.4	45.1
Spray C-------------	100.6	24.8

It was apparent that the lead arsenate spray gave almost complete protection of the plants and that sprays A, B, and C were definitely inferior. A statistical analysis showed that in this case a difference of 28.1 in the average number of leaves eaten was needed for significant differences (5 percent odds). On this basis the differences between spray C and either spray A or spray B were not far from the borderline of significance. This procedure has the advantage that the sprayed plants can be taken to a locality where a heavy infestation is present; it is not dependent on chance, as was the case in the past, when experimental sprays were applied in orchards with no assurance that the infestation would be as severe as in the previous season.

Cage production of oriental fruit moth parasite.--The role of Macrocentrus ancylivorus Roh. in reducing oriental fruit moth infestation in peach is becoming more generally recognized, and the possibilities of large-scale production of this parasite are of increasing interest. The oriental fruit moth project at Moorestown, N. J., has been propagating this parasite in field cages over strawberry since 1937. The results reported by H. W. Allen, in charge of this work, are summarized in the following table.

Year	Size of caged area	Parasites obtained			Propagation rate			
		Females used in breeding	Total	Females	Total females obtained for each female used in breeding	Parasites obtained per acre	Parasites obtained per 1,000 infested leaves collected	Unusable insects per 1,000 emerging
	Sq.ft.	Number	Number	Number	Number	Thousands	Number	Number
1937--	300	45	1,079	548	12	157	261	619
1938--	1,200	506	17,453	6,125	10	634	747	229
1940--	4,158	2,052	45,008	18,909	9	470	555	405

The size of the caged area has been increased each year, from 300 square feet in 1937 to 4,158 square feet in 1940, and the results obtained from the larger size cages have been as a whole better than from the first cage tried. The number of Macrocentrus propagated has increased from 1,079 in 1937 to 45,008 in 1940. The propagation rates from field cages were higher than those from field-collected material. In 1940 the open strawberry fields about Moorestown averaged 25,000 Macrocentrus per acre, of which about 13,000 per acre could be reared. This is in marked contrast to the rate of 470,000 per acre obtained in the cages. From the field-collected material 248 Macrocentrus were reared from each thousand leaves collected, as compared to 555 from the cage material. This means that less than half the space was required to house the caged-reared material, and half the time required to collect it and care for it through the rearing period, for each unit of parasites obtained. From the field-collected material there were 724 unusable insects out of each thousand, as compared to 405 in the cage-bred material. Thus the field-collected material required nearly twice as much time to sort out and assemble each unit of parasites as did the cage-bred material.

MEXICAN FRUITFLY CONTROL

Conditions in the lower Rio Grande Valley.--The 1940-41 Texas citrus fruit crop made only nominal gains toward maturity during September. Maturity tests made by the Texas State maturity division indicated that very little fruit would be ready for harvesting when the season was officially opened early in October. It was reported that grapefruit particularly was short in juice content, but that some of the pink varieties would probably meet the requirements early in the month. Oranges have progressed more rapidly and it was expected that harvesting of this variety of fruit would exceed grapefruit harvesting when the season opened. Although traps were operated throughout the regulated area during September, only 11 specimens of the family Trypetidae were submitted for identification. Four of these were Anastrepha ludens Loew, 3 A. serpentina Wied., and 4 A. pallens Coq. In Matamoros, Mexico, 6 adult A. ludens were trapped on 5 properties and 316 Anastrepha larvae were collected from fruit on the markets. There continues to be a noticeable deficit in the rainfall for the lower Rio Grande Valley area. Only 1.58 inches were recorded at Brownsville in September. The normal is 5.52 inches, and the accumulated deficit from January 1 is 8.82 inches.

CEREAL AND FORAGE INSECT INVESTIGATIONS

Insecticides for control of European corn borer in sweet corn.--D. D. Questel, Toledo, Ohio, reports the results of field-plot insecticide investigations for control of the European corn borer near Toledo, Ohio, during the 1940 season as follows: "Ground derris spray, as in previous years, provided high protection to early market sweet corn, with no resulting plant injury. The total borer reduction with ground derris root (4.7% rotenone), 4 pounds to 100 gallons of water, showed no advantage over 3 pounds to 100 gallons. Results of current season's investigations indicate that ground derris can be used satisfactorily at the 3-pound dilution, and that possibly a dilution of 2 pounds to 100 gallons would be satisfactory for commercial use. Two synthetic cryolite preparations, used at the rate of 1 pound to 100 gallons of water, gave high borer reductions but also caused stunting and reduction in yield. Attempts to find a buffer to prevent the burning action of cryolite on corn, in cooperation with the Insecticide Division, and prior to the regular spraying season, failed after 80 various combinations and preparations were given field tests. Ground derris, 90 percent, mixed with synthetic cryolite, 10 percent, and sprayed at the rate of 2 pounds to 100 gallons of water, gave high control but caused typical cryolite injury. Among the new materials tested in spray combinations, azobenzene gave the highest control, although accompanied by some bleaching and plant injury. Two of the new materials, phenazine and E-1538, caused very severe plant injury and reduced yields greatly; however, none of the new materials tested provided protection from the borer comparable to the derris preparations and, in conjunction with their injurious effects, are not considered of value for possible commercial use against the European corn borer. Ground derris dust containing 1 percent rotenone was applied at rates of 20, 30, and 40 pounds per acre. In addition, ground derris mixed with a dust carrier so as to contain 2.0, 1.0, and 0.5 percent rotenone, respectively, in the mixed dust was applied so as to provide the same rotenone dosage per treatment but in varying concentrations in the carrier. The resulting data indicate that derris-dust preparations applied either at 20 pounds per acre containing a 1-percent rotenone concentration, or 48 pounds per acre containing 0.5 percent rotenone, are as satisfactory for controlling the borer as preparations involving higher dosage or rotenone concentrations. However, as in previous years, the protection afforded by dust preparations was considerably lower than that provided by sprays and it appears that improvement in the performance of dust preparations is dependent on possible modifications of the application schedule to provide more complete coverage during the hatching period of the borer. Of the various combinations used in dust preparations, those containing 10 percent cryolite gave the most protection from the borer, although accompanied by some injury and possible yield reduction. The derris preparations provided the next highest protection with no accompanying plant injury. While dual fixed nicotine caused no plant injury, it afforded the least protection of any of the dust preparations used. Preparations of five dust carriers--walnut-shell flour, bentonite clay, wheat flour, pyrophyllite, and gypsum, mixed with 10 percent cryolite, gave control in the order named, with walnut-shell flour providing the greatest borer reduction. For dust preparations all five gave high control but all showed injury due to the cryolite and probably reduced yields. Preliminary tests were conducted with a boom sprayer (horse drawn), in cooperation with the Bureau of Agricultural Chemistry and Engineering. The results compared favorably with those obtained from hand applications and it is indicated that boom applications of spray materials can be developed for practical use in control of the European corn borer.

Stored corn insects and the "ever-normal granary."--In response to a demand resulting from the operation of the "ever-normal granary," the sum of $6,000 has been allotted to this Bureau by the Commodity Credit Corporation for stored-corn-insect investigations. This sum will be expended in the solution of problems arising from the storage of corn in farm- and government-owned bins, in cooperation with the several agencies concerned in the operation of the "ever-normal granary." Temple F. Winburn, of the Manhattan, Kans., staff, has been assigned to this work under the supervision of R. T. Cotton, with headquarters at Urbana, Ill. Mr. Winburn's mail address is P. O. Box 62.

Alfalfa weevil project terminated and Mormon cricket research expanded.--On June 30, 1940, the alfalfa weevil research project, with headquarters located at Room 483 Federal Building, Salt Lake City, Utah, was terminated. This project, which was begun in 1910, and therefore was conducted for a period of 30 years, resulted in a thorough knowledge of the bionomics of the insect and the origination of satisfactory and economical control methods. Coincident with the termination of this project the research work on the Mormon cricket has been expanded by the establishment of a new station at Winnemucca, Nev. J. C. Hamlin, formerly in charge of the alfalfa weevil project, was placed in charge. The street address is: Corner of West Fifth and Pavilion Streets, and the mailing address is P. O. Box 76, Winnemucca, Nev. H. H. Walkden, formerly located at Manhattan, Kans., has been designated as assistant at Winnemucca.

Corn borer infestation in growing wheat.--The following report of corn borer infestation in wheat was received on July 11 from C. A. Clark, Moorestown, N. J.: "This wheatfield was located at Vincentown, Burlington County, N. J. On July 13 an examination was made and extensive breakage was evident. An examination of the stems showed approximately 25 percent infestation. Some borers, which at this time were almost all mature larvae, could still be found but extensive migration had taken place from the dried-up and broken stems, and most of the stems showing evidence of infestation were empty at the time of the examination. This is the first case of a serious corn borer infestation in a field of farm-grown wheat to come to the attention of the writer."

Damage to popcorn by European corn borer.--Morris Schlosberg, Toledo, Ohio, reports that in a series of samples of popcorn plants differentially infested with European corn borer egg masses by hand in 1940, near Toledo, the surviving larval progenies averaged 4.3, 10.3, 16.7, and 19.7 larvae per plant. On the basis of 20 plants, as an average of 3 replicated tests in each instance, the resultant yields of ears, as harvested, were 4.95, 3.43, 1.93, and 0.97 pounds, respectively, for the levels of population given above. When plotted in a graph, the relation between yields and levels of larval populations was indicated to be linear. The potential yield in the absence of borers was calculated to be 6.067 pounds per 20 plants, the reduction in yield per additional borer per plant 0.254 pound, and the percentage reduction per additional borer per plant 4.19. In a similar series of tests conducted in 1939, involving a range of populations up to 6.52 larvae per plant and the same hybrid strain of popcorn, each additional larva per plant reduced the potential yield in the absence of borers by 6.36 percent. As in 1940, the relation between yields and levels of larval populations was found to be linear. Allowing for experimental variation, the difference between the values of percentage loss per additional larva per plant obtained in 1939 and 1940 is attributed to the relative stages of development of the plants when infestation occurred in the different seasons. In 1939 the plants were infested 27 days prior to silking of 50 percent of the plants, and in 1940 infestation occurred 14 days before silking of 50 percent of the plants. It has been shown that a greater per-borer loss is associated with infestation at earlier stages of plant development, owing to greater injury of the plants. The differences in development of the plants in the 2 seasons when infestation occurred were also reflected in the survival of larval progenies. For nearly similar infestations with numbers of eggs, the experiment averages in 1939 and 1940 were 4.2 and 12.8 larvae per plant, respectively. In part, the higher value obtained in 1940 may be attributed to the presence of the tassels on the plants in that season when infestation occurred, the mean date of tasseling and date of infestation being coincident, July 27. The presence of the tassels when infestation occurs has been found conducive to higher survival rates of larval progenies, independently of the influence of stage of development of the plants prior to the phenomenon of tassel appearance.

JAPANESE BEETLE CONTROL

New soil-treating equipment purchased.--Several new features are incorporated in six soil-treating sprayers recently purchased. The most important innovation consists of dual pumps, one for water and the other for lead arsenate solution. The tank is divided into two compartments, both of which are used for lead arsenate solution. By means of a 1½-inch hose, the unit is connected directly with a city water supply. The water pump merely acts as a booster for the city water. Although 40 gallons per minute can be obtained from the water supply, only 20 g.p.m. are needed in the water pump, therefore an equal quantity is available for alternately filling the lead arsenate tanks. In this way the application of lead arsenate and the subsequent washing in of the lead arsenate is a continuous, concurrent operation. Four lines of hose can be used, two each for the water and the insecticide. A special by-pass hook-up is used on the pumps. Instead of by-passing into the tanks, they are by-passed back into their respective intake lines, which permits the nozzleman to shut off any or all lines and the pump will still continue to operate without adjustment. It is anticipated that one of these units is capable of treating as much ground as two of the old type, single-pump sprayers. All foremen and truck drivers who have been previously assigned to soil-treating operations were called to Bloomfield the latter part of September and instructed in the operation of these new machines. An improved technique of application has been worked out, based on new nozzle designs and methods of checking the accuracy of lead arsenate application.

Floating oriental mats investigated.--Following up a report that appeared in the sports column of a Richmond, Va., newspaper, inspectors of this Division investigated the alleged finding of Japanese beetles in bunches of fresh leaves in the center of floating mats of bulrushes or reed and ricegrass which had been dumped into Chesapeake Bay by Japanese ships bringing cargoes to Norfolk and Baltimore. The story was to the effect that these mats are used in buttressing the cargoes to prevent shifting in rough weather, and that just before the ships dock the mats are thrown overboard. Individuals and Coast Guard officials near Cape Charles, Va., having knowledge of these mats were interviewed. One Coast Guardsman said that he had noticed these mats along the shoreline and beaches for the last 20 years. A Coast Guard truckdriver took the inspectors for a tour of approximately 30 miles along the shore line. Several of the mats were found and examined, but no living Japanese beetles were found in them. Flotations of Japanese beetles from the heavy infestations in both Delaware and Maryland have been numerous in recent years and what has apparently happened is that the straw mats thrown overboard have accumulated a lot of floating weeds and a quantity of Japanese beetles, some of which may have worked their way into the middle.

Outlook for fall nursery shipments.--The increase in nursery and landscaping business is attributed to the large number of new homes being built. Inspection work has already increased in the Eastern Shore area, owing to the finding of Japanese beetles on practically all nurseries in that area, thus requiring the actual inspection or chemical treatment of stock shipped from these establishments. A report from Philadelphia indicates that the wholesale cut-flower business there this summer was better than in 1939. Several Philadelphia nurserymen predicted a good fall business, with a substantial number of orders on hand. Considerable building being done in the Philadelphia area should increase the demand for landscaping.

Chemical treatments.--A nursery at Bridgeton, N. J., has constructed a large addition to their present packing shed for use primarily in treating azaleas with paradichlorobenzene. At one end of this addition a large fan is placed to remove gas from the building. A heating system is provided to keep the temperature up to the required point, regardless of outside conditions. In northern New Jersey 30,000 azalea plants were treated with paradichlorobenzene during the month. These treatments will continue into October. Azalea treatments with methyl bromide were started early this year, as compared with 1939, affording an opportunity to pick days on which temperatures were more satisfactory for this type of fumigation. During September, 136,166 plants were fumigated with methyl bromide, as compared with 125,327 fumigated with this product in August, and 89 carloads of potatoes were also fumigated with methyl bromide during the short period early in the month when this was required.

Precautions to prevent infestation of refrigerator cars by flying beetles lifted.--By September 9, flight of the Japanese beetle had subsided sufficiently in the heavily infested area so that requirements for the inspection or fumigation of refrigerator cars before they were loaded with certified fruits and vegetables, and the provisions for screening such cars, were discontinued on that date. Certification of fruits and vegetables moving from the heavily infested area via refrigerator car and motortruck was continued through September 18, after which the seasonal quarantine on farm products was discontinued for the year. As usual, the inspection and certification of cut flowers moving from the regulated area were continued until October 15, as beetles this year were present, but not in flight, later in the season than usual in many sections of the infested zone.

Control at isolated infestations.--Soil treating in Atlanta, Ga., which started on August 14, was completed on September 4, with a total of 14.8 acres treated, of which 1.2 acres was treated in September. In East Point, Ga., 9.6 acres of soil was treated August 26 to September 7, inclusive, with 4.8 acres treated late in August and 4.8 acres early in September. In Chicago, Ill., 46 acres of soil was treated in the period August 29 to September 30, of which 5.7 acres was treated in August, and 40.3 acres in September. In Fort Wayne, Ind., 13.7 acres of soil was treated on September 6 to 17, inclusive, and in Warsaw, Ind., 9.9 acres was treated on

September 23 to 30, inclusive, the last treatments continuing into October. In Detroit, Mich., 34.6 acres of soil was treated on September 9 to 30, with operations only partially complete.

Trapping completed.--During September, lifting of Japanese beetle traps was completed in 6 cities in Arizona; 1 city each in Minneosta, Nebraska, New Mexico, North Dakota, Utah, and Wyoming; 2 cities each in Colorado, Idaho, Indiana, Louisiana, Michigan, Mississippi, Tennessee, and Vermont; 3 in Illinois; 4 each in California, Missouri, Oregon, and Wisconsin; 5 in Washington; 8 in Pennsylvania; 14 in Maine; 19 in Texas; 20 in New York; and 42 in Maryland. The Maryland traps were operated by the State in connection with their retardation campaign. The only traps still in operation at the end of the month were a few in California and Vermont and in a number of small communities in other States which crews had not yet reached to dismantle.

New details of fumigation chamber construction.--Supplement No. 1 to the handbook previously distributed to inspectors, showing construction details for an approved methyl bromide fumigation chamber, was issued during the month. The supplement gives details for the construction of a chamber of approximately 200-cubic foot capacity. It includes a purchase list, and a material list, along with detailed drawings of the framing, doors, lining, and electrical wiring and connections.

Fish story.--Information was furnished to the district inspector in New York City by one of the port inspectors there to the effect that while fishing in the Rockaway River near Dover, N. J., on September 4, the inspector caught 3 brown trout. When these fish were cleaned, a total of 31 Japanese beetles were removed from their stomachs. One contained 5 beetles, another 6, and the third 20. Some of the beetles were still alive.

Airport inspection.--The inspector stationed at the Philadelphia Airport from July 14 to August 31, found 79 beetles, 2 dead and 77 alive, in and on departing planes. Nine were in the planes, 12 on baggage, 31 on passengers, 9 on members of the crews, 16 on mail pouches, and 2 on mechanics. Beetles along the Philadelphia water front, except in the extreme southern part of the city, were scarce.

Dutch elm disease scouting results.--Suspect scouting within the known infected area, which was rather largely and intensively scouted by the foot-scouting method last year, was this year handled largely by auto and auto-foot types of scouting. There were, however, 65 areas selected on the basis of last year's infestation and widely scattered throughout Connecticut, New York, New Jersey, and Pennsylvania, which were intensively scouted this year. There was a 60-percent reduction in disease this year over last year in these intensively scouted areas, as compared with a 65-percent reduction over the entire infected area of the State. No scout schools were conducted this year and hence the full time of the scouts was used in actual scouting work. This could be done because there were available 850 W. P. A. scouts who were trained last year, and 450 of the highest ranking per diem scouts of last year and other trained scouts that could be employed on regular funds this year for work in the major area.

First-record Dutch elm disease infections.--In New Haven County, Conn., first-record infections were reported from the towns of Middlebury, Naugatuck, New Haven, Orange, and Woodbridge. New York townships in which confirmed trees were found for the first time were Bainbridge, in Chenango County, and Claverack and Taghkanic, in Columbia County. Also, first-record infections were reported from the city of Kingston, in Luzerne County, and from the townships of Jackson and Lanesboro, in Susquehanna County, Pa. Three diseased trees were discovered by scouts working outside of the main infected area during the month. Two of these were found in Washington Township and the other in Pike Township, both in Marion County, Ind.

Ice damage handicaps work.--In Connecticut apparent major symptoms that warranted climbing for the purpose of obtaining samples, and in most cases on the larger shade trees, proved to be the result of the ice-storm damage of last March. No actual breakage was visible and in most instances it was not until the cuttings were dropped to the ground that these limbs, about 1 inch in diameter, were found to be twisted rather than broken off. The tree had attemoted to heal on the twisted part, and it is evident that perfect recovery cannot occur.

Drop in New Jersey confirmations.--The week ended September 7 was the first time since 1935 that the number of trees confirmed in New Jersey during the scouting season was less than the number confirmed in either Connecticut or New York, 51 having been confirmed in New Jersey, 73 in Connecticut, and 95 in New York.

Elm scouting discontinued.--Suspect scouting was discontinued in the entire work area on September 28. During the summer scouting season a total of 15,746 square miles was scouted on the first suspect survey, and 13,230 square miles on the second suspect survey.

Decreased W. P. A. personnel.--The W. P. A. personnel in Connecticut and New York has shown a gradual decrease in numbers, owing to the assignment of project employees to job training under the supervision of the National Defense Commission.

New England inspection activities.--Last summer weather conditions in New England were very favorable for Japanese beetle scouting, there being few rainy days throughout the season. Scouting was discontinued on September 7. Infestations were found as follows: Connecticut, 21 units in 9 nurseries; Massachusetts, 3 nurseries and 2 greenhouses; New Hampshire, 1 perennial garden; Rhode Island, 2 nurseries and 1 private estate. Beetles were observed feeding at Bellows Falls, Vt., on September 23 and in New London, Conn., on the 27th. Eight temporary gypsy moth inspectors were employed during the month--3 in Maine, New Hampshire, and Vermont for the carlot inspection of lumber, and 5 in western Maine, western Massachusetts, Rhode Island, and Connecticut for the inspection of nursery stock. Connecticut State gypsy moth scouting crews reported the finding of several gypsy moth infestations within a radius of 1 mile from 3 large nurseries in the Manchester, Conn., area. During the month 401 egg masses were removed from forest, quarry, and nursery products submitted for inspection.

At Danvers, Mass., 133 egg clusters were removed from $10\frac{1}{2}$ cords of birchwood inspected prior to its manufacture into novelties. At Winchendon, Mass 3 egg masses were removed from 2 bales of birch bark also intended for novel manufacture. At Westfield, Mass., a female gypsy moth was observed depositi eggs on September 9, an unusually late date for oviposition.

Hurricane lumber sold.--Orderly marketing over a period of $4\frac{1}{4}$ years is provided for in the sales' terms of a contract by which 425,000,000 board feet of the softwood lumber salvaged in the New England States by the Government was sold recently to a corporation. Gradual distribution of this lumber will facilitate its inspection under the gypsy moth quarantine regulations.

FOREST INSECT INVESTIGATIONS

Ambrosia beetle attacks elm trees.--In studying the habits of an introduced ambrosia beetle, *Xylosandrus germanus* (Bldfd.), W. D. Buchanan, of the Morristown, N. J., laboratory, has found that the adults will attack areas on living trees from which the bark has been entirely or partially removed. The bark was shaved from parts of the trunks of several woodland elms so as to leave only a thin layer of the inner bark. Muslin sleeves were attached to the trunks so as to enclose the shaved portions and the surrounding uninjured bark. Beetles that were introduced into the sleeves bored into only the shaved areas. On other trees areas were similarly shaved or the bark removed entirely. No sleeves were attached to these trees. Again the beetles attacked only the injured areas. This indicates that *X. germanus* adults rarely if ever bore through the unbroken bark of living trees but will attack surfaces from which the bark had been partly or entirely removed.

Dutch elm disease spreads where Scolytus multistriatus does not occur.--In 1939 and 1940, R. T. Webber, Morristown, made observations on elms in Broome and Chenango Counties, N. Y. Trees affected by the Dutch elm disease were first found in this area in 1939 by the Bureau's Dutch elm disease eradication unit. Findings in 1940 have not only increased the total number of diseased trees but extended the limits of the area into neighboring parts of New York and Pennsylvania. This area is particularly interesting from an insect standpoint because no *S. multistriatus* (Marsh.), which is considered the most important insect vector of the Dutch elm disease fungus in the United States, has been found there. Mr. Webber states that the elms in the area are generally in poor condition, with considerable dead wood in them, and they have suckered freely. The disease has apparently been present for several years. Ideal conditions exist for a build-up of certain insects such as *Hylurgopinus rufipes* (Eich.), *Saperda tridentata* Oliv., and *Magdalis* spp. *H. rufipes* is and has been very abundant, and it has been found that the adults have commonly penetrated the bark of diseased trees and contacted the xylem. Larval galleries of *H. rufipes* and *S. tridentata*, extending from dead to living parts of the bark and wood, were also found. These observations, with others, indicate that *H. rufipes* and possibly other species, are responsible for the disease persisting and spreading in the area.

Hemlock looper less abundant in Wisconsin this year.--H. C. Secrest, Milwaukee, Wis., reports that the looper population in 1940 in hemlock stands on the Menominee Indian Reservation decreased from that of 1939, when larvae were somewhat common. This decrease probably was caused by the cold, cloudy, and very wet weather in June when the young larvae were crawling to the foliage.

Hemlock borer attack decreases in Wisconsin.--Mr. Secrest reports a very noticeable reduction in the beetle population for the first time since the hemlock borer project was initiated in 1937. Salvage of practically all the remaining dead and dying trees during the winter and their utilization before the beetles could mature and emerge reduced the population in a marked degree. The favorable growing seasons since 1938 made the living trees more vigorous and less suitable for successful attacks. Parasites were numerous again this year, approximately 50 percent of the larvae in many of the trees having been parasitized. It is expected that the borer population will be even further reduced in 1941 because of these factors.

Bronzed birch borer active in yellow birch in Wisconsin.--H. J. MacAloney, Milwaukee, reports that limited examinations in August of stagheaded decadent yellow birch in the cutover stands at the Menominee Indian Reservation showed that these trees were being attacked by the bronzed birch borer. These stands have been opened up during the course of salvage operations to remove dead, dying, and uprooted hemlock, to an extent which weakened the brich trees and allowed successful attack by the birch borer. The secondary nature of the attack was indicated by the fact that the bole and lower branches were attacked at the same time as the upper branches, and in some cases larvae were numerous in the lower part of the tree. The shoestring fungus was found at the bases of these decadent trees.

Decrease in budworm abundance in Minnesota.--Mr. MacAloney reports very light defoliation of jack pine on the Chippewa National Forest this year by the spruce budworm. Caterpillars were numerous in stands on the Cass Lake Ranger District in June, but very few completed development. This reduction is attributed to the cold, driving rains at the time the caterpillars were leaving the staminate flowers to feed on the foliage. Elsewhere on this forest caterpillars were scarce and defoliation was not noticeable. Examinations of buds of orchard-type jack pine trees in September indicate that staminate flowers in stands on the Cass Lake Ranger District will be abundant and, because of this, budworm abundance may increase in 1941. In other parts of the forest, however, there will be a scarcity of flowers and a still further reduction in caterpillar abundance may be expected.

Forest tent caterpillar apparently absent from national forest stands in Minnesota.--Mr. MacAloney also reports that for the second year no egg bands were found in the plots established in aspen stands on the Chippewa National Forest for the purpose of getting annual counts of the number of egg bands per tree. No larvae were found during the feeding season.

A root crown girdler of pine.--J. V. Schaffner, Jr., New Haven, Conn., reports that, in cooperation with the New York Conservation Department, examinations were made in September of Scotch pine plantations in the townships of Malta, Milton, and Moreau, in Saratoga County, N. Y., where Hylobius radicis Buch. caused considerable mortality about 1933 and shortly thereafter. Infestations of this root crown girdler are now generally light in these areas. Nearly every tree examined showed evidence of past infestation but apparently not all trees are infested at present. Although an occasional tree has died recently it is evident that no heavy mortality of trees has occurred during the last 5 to 7 years. Many trees which have survived heavy infestations are badly stunted and have exceedingly large butts in comparison to their height. However, although badly scarred at the root crowns, recent growth of the trees in these plantations is evidence of a general improvement. The plantations of Scotch pine which have been heavily infested are growing on very light sandy soil. The infestation still persists in a plantation of Corsican and Scotch pine in Weston, Mass., where observations have been made in the last two seasons and where the most severely infested trees were broken over in the hurricane of September 1938. Studies of the biology of this insect show a very complicated life cycle. Hibernation takes place both in the larval and adult stages, and all stages of the insect can be found during July and August. Laboratory experiments indicate that some of the adults may live over a period of at least 2 years. Adults which developed in the summer of 1939 mated and deposited eggs in June, July, and August 1940 and are still active and feeding considerably on the bark of pine twigs.

Exenterus marginatorius as a parasite of pine sawflies.--W. F. Sellers, New Haven, Conn., reports that E. marginatorius (F.) is ordinarily a common larval parasite of the European pine sawfly (Neodiprion sertifer (Geoff.)). This parasite was introduced into Canada by the Canadian entomologists and it has become established and is being recovered in considerable numbers as a parasite of the European spruce sawfly. As far as known, this parasite is of no importance in Europe as a parasite of the European spruce sawfly. Under laboratory conditions E. marginatorius oviposits as readily on Le Conte's pine sawfly and the introduced European pine sawfly Gilpinia frutetorum F. as it does on the European spruce sawfly. This parasite has been successfully reared through one generation on Le Conte's pine sawfly. Le Conte's sawfly is native to this country, and at present it is being reported from widely scattered areas in epidemic proportions in our pine plantations.

Multiple superparasitization by dipterous parasites helps to control satin moth.--Mr. Sellers states that early this summer a collection of 7 larvae and 3 pupae of the satin moth was made with a great deal of difficulty by J. E. R. Holbrook, of the New Haven laboratory, at Waterbury, Conn. This collection produced 1 male and 1 female satin moth, 5 Compsilura concinnata Meig. tachinid parasites, and 14 Exorista mella Walker tachinid para sites. In 1 specific instance at least 1 Compsilura and 1 Exorista puparium were recovered from the same host pupa. It was apparent from the large numbers of E. mella and C. concinnata obtained that some cases of multiple superparasitization, which means survival of 2 or more species of parasites, occurred. Superparasitization means survival of more than 1 individual of same species. Mr. Sellers observed in other cases that under equal conditions of competition and host selection, a species of Tachinidae capable of superparasitization can coinhabit the same host specimen along with another species which is also capable of superparasitization; whereas when a species capable only of solitary parasitization (survival of 1 specimen) enters into competition to coinhabit the same host specimen with another species capable of either solitary or superparasitization, only 1 species will survive.

Large proportion of white pine trees still alive in certain hurricane-affected stands.--H. A. Bess, New Haven, reports that a few of the unsalvaged hurricane-felled white pine stands in Winchendon, Mass., and vicinity were examined from time to time throughout this season for insect damage and salvageability. In the spring as high as 70 percent of the trees present were living and undamaged by insects. The conclusions drawn from these studies are that there was practically no further mortality of the trees this season and none of the living trees were injured by insects. Probably the relatively cool wet season prolonged the survival of these trees.

Heavy spruce bark beetle infestation in section of White Mountain National Forest.--T. J. Parr, New Haven, after a survey of spruce areas on the White Mountain National Forest of New Hampshire and the Green Mountain National Forest of Vermont during the latter half of August, reports as follows on Dendroctonus piceaperda Hopk. conditions: "In New Hampshire, areas where the spruce bark beetle was present previous to the hurricane show no increase in infestation, either in standing or wind-thrown timber, except in the Crawford Notch section. In fact, infestations have materially decreased or entirely disappeared in such areas as "The Bowl" at Wonalancet, Nancy Brook near Bartlett, and Mt. Osceola in Waterville Valley. In the Beecher Brook drainage in Crawford Notch, where wind-thrown timber is now being logged, a small stand of approximately 10 acres of old, standing spruce, located above the present timber sale, was found infested. It was estimated that nearly 50 percent of the trees on that plot were attacked. On the opposite side of Crawford Notch a much larger area of mature spruce is heavily infested. On one survey strip in that area 10 chains long and 1 chain wide, 10 heavily attacked trees were found, or 10 trees per acre. Attacks were characterized by the absence of pitch tubes on the tree trunks. The insects were in all stages from eggs to adults. A 100-percent survey of this area, to determine the extent of the infestation and to mark attacked trees for subsequent removal, was recommended. In Vermont some increase in the number of infested trees was noted on the permanent 54-acre sample strip on Monastery Mountain, where 11 infested trees were found this year, as compared with 2 in 1939 and 8 in 1938. There was a proportionate increase in attacked trees along the Long Trail from the junction of the Trail with the sample strip to Lake Pleiad. Only 2 attacked trees were found there in 1939, while 8 infested trees were spotted this year."

Forest-insect surveys.--The program of forest-insect surveys conducted from the forest-insect laboratory at Coeur d'Alene, Idaho, includes the white pine stands of the Coeur d'Alene, Clearwater, Kaniksu, Kootenai, and St. Joe National Forests, the lodgepole pine stands of the Minidoka National Forest and Yellowstone National Park, and some areas of ponderosa pine on the Salmon National Forest, as well as a small area of Douglas fir on the Sawtooth National Forest. Approximately 900,000 acres of merchantable timber will be covered by these surveys. They will show the present status of infestations of the mountain pine beetle in white pine and lodgepole pine, the western pine beetle in ponderosa pine, and the Douglas fir beetle in Douglas fir. This project will be completed during the latter part of October and reports of each area will be submitted promptly. As yet no serious infestations have been encountered, although there are small areas on the Coeur d'Alene and Clearwater National Forests where the infestation is sufficiently severe to warrant the institution of control, which has been recommended.

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

Gypsy moth larvae and pupae unusually late.--The development of gypsy moth larvae in the barrier zone and in Pennsvylania was decidedly uneven during the summer of 1940. Cool weather persisted well toward the end of June, and there was a heavy frost in some localities on June 23. The weather was cool again during the latter part of the summer, with a heavy frost in some sections, particularly in western Massachusetts, on August 23. This cool weather apparently slowed up the development of some of the larvae, so that they were present in the field much later than usual. As a rule, the moths complete emergence by the end of August or the beginning of September, although occasionally a few straggling moths can be found early in September. This year a considerable number of live pupae and moths have been located unusually late, not only in the Pennsylvania infested area but also in a good many towns within the barrier zone. The discovery of so many live pupae and adults has interfered to some extent with the scouting program. It is usually safe to start scouting immediately after the first of September, as all of the egg clusters will have been deposited by that time, but this scouting had to be discontinued until later at some localities because of the finding of live pupae. These are much more difficult to locate than egg clusters, and it is not advisable to scout in woodland until after the egg clusters are deposited. Records show the finding of live pupae, both male and female, of female moths just emerging from the pupal cases, and female moths laying, throughout the month of September and even into early October. Live gypsy moth larvae were found under burlap bands at one town in Connecticut on September 16.

Forest growth retains foliage because of no killing frosts.--Climatic conditions were generally favorable for gypsy moth work during September. The temperatures remained unusually low during the first part of the month, although no severe frosts or freezing temperatures have occurred since August 23; however, abundant evidence of the damage suffered on that date is present throughout New England. Foliage of vines and shrubs, such as poison ivy and sumac, have assumed the brilliant colors typical of fall conditions. Lack of rain for several weeks enhanced the forest fire hazard, and regulations prohibiting smoking or building fires by gypsy moth workers were rigidly enforced. The burning of brush accumulated as a result of thinning operations was also temporarily discontinued. Heavy dews and early morning fogs toward the middle of September left the forest growth dripping wet and caused some discomfort to the workers during the early hours of the day. A definite thinning of the foliage was discernible in the northern Vermont section of the barrier zone shortly after the middle of the month, as some varieties of trees and shrubs began to shed their leaves. No appreciable change in foliage density was apparent elsewhere in the barrier zone, although traces of fall coloring were occasionally noticeable on high slopes.

Work areas carefully selected in Vermont.--Because of the small force of workers which, apparently, will be available for gypsy moth work in Vermont during the coming winter, considerable time has been spent by the supervisory personnel in that State in examining the vicinity of infestations found during the past fiscal year in Addison and Rutland Counties, in order to determine where the work in the Vermont barrier zone area can be done most effectively with the prospective maximum of only 10 crews. Although satisfactory results were obtained from the treatment of the infestations found last year, a large area of heavily timbered mountainous country that should be carefully scouted before the advent of winter conditions still remains.

Several gypsy moth infestations found in Addison County, Vt.--A small force of supervisory employees detailed to scout around several gypsy moth infestations found in Ripton, Addison County, during 1939 discovered no indications of reinfestation at these previously infested locations. However, they found and creosoted several egg clusters deposited on fruit trees and on the under side of garden furniture at another previously infested site, and two moths were seen depositing eggs at this infestation during the first week in September. W. P. A. scouting crews working in Bristol, Middlebury, and Salisbury Townships, also in Addison County, discovered several reinfested spots at sites that had been banded with burlap but which had not been sprayed. Many of the egg clusters were found on deadwood and windfalls, which littered the ground.

Two new infestations located in Rutland County, Vt.--A newly laid gypsy moth egg cluster was found in Hubbardston Township, Rutland County, about the middle of September. Although this is the first infestation to be located in Hubbardston, the infestation of the town was not entirely unexpected in view of its close proximity to territory just east of the barrier zone, where numerous small infestations have persisted for several years and which are so located that new infestations might originate from the wind spread of small caterpillars. A small gypsy moth colony was also located in the adjoining town of Castleton, the first to be discovered there since 1924, when a gypsy moth colony covering several acres of rocky brush-covered pastureland was completely eradicated by intensive treatment work. Similar work will be done at the two new colonies.

Gypsy moth colony found on mountain slope in Vermont.--A W. P. A. crew scouting in Lowell Township, Orleans County, located a gypsy moth egg cluster on the north slope of Hadley Mountain, which is situated in the south-central section of the township. This egg cluster was found about ½ mile from the wood edge in an extensive tract of timberland consisting chiefly of rock maple, beech, and white, yellow, and black birches, with some spruce and fir balsam on the upper slopes. Intensive scouting in the vicinity of this infestation will be postponed until after the foliage has fallen.

Gypsy moth work in Connecticut.--Gypsy moth work in Connecticut has not progressed as rapidly as was expected, owing to the difficulty in obtaining and maintaining a full quota of workers. Several small infestations were found in Cornwall, Salisbury, and Litchfield Townships, in Litchfield County, and two small colonies were found in the Southbury, New Haven County, area that was infested last year. The disposal of brush accumulated as a result of thinning work conducted at West Hartford prior to July 1, 1940, was completed during the first week in September. The power-operated brush-disposal machine used at this infestation reduced more than 500 piles of brush to coarse sawdust and chips within 10 days, during a period when the dryness of the forests made burning impractical. Several crews engaged in removing burlap bands from infested sites in the Connecticut barrier zone area reported observing moths depositing egg clusters on or near the bands up to the middle of September. These egg clusters were creosoted, and the burlap bands containing egg clusters were carefully assembled for burning. At the end of the band-removal work it was found that approximately one-half of the bands were infested and would have to be burned, while the other half were suitable for salvage and future use in kindling brush fires.

Scouting of Lackawanna and Susquehanna River banks completed.--Despite the delays encountered in getting the gypsy moth project operating in Pennsylvania, 30 crews were working in that State by the first of September. A large percentage of the force was engaged at first in removing burlap bands from trees at infested sites. Later, several of the crews were detailed to the examination of driftwood and debris along the banks of the Lackawanna and Susquehanna Rivers. Whenever these rivers overflow large quantities of driftwood and debris are strewn along the river courses, lodging in the clumps of trees and brush that cover the islands and frequently extend in belts 100 feet or more in width along the banks. This rubbish must be disentangled and carefully examined. Fortunately, conditions were ideal for this type of work, as the rivers were low and many of the brush-covered islands could be reached over a dry river bed or by wading through shallow water. This work was completed during the week ended September 21 and resulted in the discovery of only 1 egg cluster, which was deposited on a small elm. The systematic scouting of the river banks within the quarantined area has been done every year since the gypsy moth was first discovered in Pennsylvania, in order to destroy infestations on river debris that might be carried downstream during periods of high water.

Types of C. C. C. gypsy moth work performed during September.--The number of 6-hour man-days used by the C. C. C. on gypsy moth work during September ranged from a weekly low of 1,378 to a weekly high of 1,742, totaling 6,435 man-days for the month. The time was spent in selective-thinning work, removing sprout growth at previously thinned areas, scouting, and creosoting egg clusters at infestations. Several large single white oak trees were also removed from locations that were especially susceptible to wind spread. Emphasis was placed on the removal of sprouts of plants favored as food by the gypsy moth and leaving sprouts of unfavorable growth, and a good growth of ash, maple, and pine is developing in several areas where this type of work has been done. In some places brush and debris accumulated from the thinning was burned but in other instances it was scattered, as is done with sprouts when they are cut. Such material will decompose before these areas will be reexamined. This reduces considerably the cost of operation and is in accordance with good forestry practices. The silvicultural treatment of different forest growths is stressed continually in C. C. C. gypsy moth work, and meetings are held from time to time with State forestry officials in order to coordinate and improve the methods of treatment. It is possible that C. C. C. gypsy moth work may be reduced in some of the States because of the prospective transfer of some of the camps or enrollees from their present work assignments to aid in the National Preparedness Program.

Report of C. C. C. burlapping work.--Most of the work of banding trees with burlap to trap gypsy moth caterpillars was delayed until the end of

June or the first part of July, as most of the men available were used on spraying work earlier in June, and the banding work was concluded at the beginning of September. As the season was late this year, owing to cold and rainy weather, the banding work showed good results despite the late start. One camp in Vermont burlapped trees on 201 acres, destroying 152,077 gypsy moth caterpillars and pupae. Three camps in Massachusetts burlapped trees on 603 acres and destroyed 91,502 caterpillars and pupae, and 3 camps in Connecticut burlapped trees on 244 acres and destroyed 50,856 caterpillars and pupae. In some cases the bands were removed from the trees early in September, but in others, where it was anticipated they could be patrolled to good advantage next year, the bands are left on the trees, a practice which has heretofore proved satisfactory and which greatly reduced the cost of operation by saving labor, besides getting 2 seasons' use of the burlap.

Areas selectively thinned last year show marked improvement.--Although C, C, C, gypsy moth work so far this year has consisted principally of silvicultural work, a small amount of scouting was done. The scouts have discovered no heavy infestations in Massachusetts or Connecticut, but the infestation is much denser in eastern Vermont. Marked improvement was noted at several locations in the last-named State, where thinning work was done at heavy infestations last year.

PLANT DISEASE CONTROL

Matheny called to defense duty.--G. E. Matheny, State leader of barberry eradication in Virginia and a reserve officer in the Marine Corps, has been called to active duty for a period of 1 year. Captain Matheny reported for duty at Marine Barracks, Navy Yard, Washington, D. C., on October 15.

Preliminary results of 1940 rust survey.--R. U. Cotter, acting in charge of the Federal rust laboratory, St. Paul, Minn., reports that rust collections identified prior to September 1 indicate that races 56 and 17 were the most common in the central part of the United States this year. It will be recalled that race 56 increased rapidly in the Middle West from about 1930 to 1935, when it caused extensive damage to Marquis and Ceres wheats. Race 17 has been comparatively rare in recent years and its potentialities are not fully known. It is one of the few races which has, under certain conditions, caused some infection on Thatcher wheat. Of the 13 races of wheat stem rust so far identified this year, race 56 represents 36 percent and race 17 represents 13 percent of the isolates. Other races identified include 11, 15, 19, 21, 34, 36, 38, 49, 59, 69, and 147. The different varieties of stem rust present in 185 aecial collections of the fungus identified by the Federal rust laboratory this year were as follows:

Puccinia graminis tritici	145	isolates
P. graminis secalis	37	"
P. graminis avenae	16	"
P. graminis agrostidis	1	"

A single collection from Meeker County, Minn., contained all 4 of these varieties. However, most of the *secalis* isolates came from Minnesota, Wisconsin, and Iowa, where ryegrass and quackgrass are susceptible and widely distributed hosts. More than half of the avenae isolates came from Pennsylvania where stem rust has caused considerable damage to oats in areas where barberry bushes are numerous.

Crawford County, Iowa, co-sponsors barberry eradication project.--According to D. R. Shepherd, State leader in charge of barberry eradication in Iowa, plans for undertaking barberry-eradication work in Crawford and Clayton Counties under a State W. P. A. program have been approved by W. P. A. and field work authorized. County boards of supervisors in these counties have agreed to sponsor the project, along with the Bureau, and to allot sufficient funds to pay all nonlabor costs. The County boards of supervisors in these counties will furnish ½-ton or 1½-ton trucks, with all expenses for upkeep and operation, and will pay operating costs on any government-owned equipment that may be used. The Crawford County board has agreed further to purchase ½ ton of salt per month for eradication purposes.

More than 7,000 barberry bushes destroyed in Ohio since January 1.--Since the first of January, according to a report furnished by Harry Atwood, State leader in charge of barberry eradication in Ohio, an intensive survey of approximately 2,050 square miles in 7 counties has resulted in the eradication of more than 7,000 barberry bushes on 67 different properties. In this area 1,067 previously reported properties were checked and 89 were found to have 1,122 bushes, of which only 52 were fruiting. This indicates that only about 8 percent of the old properties in these counties will require further attention.

Nebraska farmers aid in rust survey.--For several years Nebraska grain growers have supplied data relative to the extent to which their crops were damaged by stem rust. During the last month questionnaire cards were mailed to 1,492 grain growers throughout the State, according to M. E. Yount, who conducted this survey. The postal service returned only 11 cards because of incorrect address. Of a possible 1,481 growers who received the questionnaire, 1,248, or 84.26 percent, gave the desired information. The list of cooperating farmers has been compiled gradually and includes 1 farmer in each township. Most of the names were obtained from county agents.

White pines and Ribes of craters of the Moon National Monument.--Craters of the Moon National Monument, in central Idaho, is a 50,000-acre area of recent volcanic activity evidenced in the nature of craters, cinder cones, and lava flows. Reported for this area were 5,600 acres supporting white pine, which prompted a recent inspection to determine the urgency of blister rust control work. This revealed a total of approximately 20,000 acres supporting patchy Pinus flexilis at the rate of 1 to 200 trees per acre, growing on the older lava flows and at the bases of cinder cones and craters on wind-deposited soil. Peculiarly, this is the only conifer in prominence, although Juniperus scopulorum, Pseudotsuga taxifolia, and Pinus ponderosa are found occasionally. Associated with the limber pine is only 1 species of Ribes, R. cereum. Like the pines, these grow in patches and range from very few to about 250 per acre. Because of this species' low susceptibility to blister rust and the semiarid conditions of the Monument and adjacent country, no urgent control problem is indicated.

Northwestern region field conference.--During the 4-day period from October 2 to 5, blister rust control and timber management leaders of the Bureau and the Forest Service met for a conference on control problems and their relation to white pine management. This meeting, which is the second in a series of annual field gatherings to discuss technical problems, was held on the Deception Creek Experimental Forest, within the Coeur d'Alene National Forest. Chairman of the meeting was Neal D. Nelson, supervisor of control work on this forest. Discussion leaders were V. D. Moss, who is in charge of the Bureau's ecological investigations, and Charles Wellner, silviculturist for the Northern Rocky Mountain forest and range experiment station. Field trips were taken to inspect and study areas treated to various silvicultural practices, and these practices and their significance were the subject of group discussions.

Demonstration of blister rust damage in Maine.--An unprotected pine stand adjacent to a State highway near Belfast, Maine, is being utilized effectively to demonstrate damage caused by blister rust to merchantable-sized trees. All pines with stem cankers have been banded with yellow paint about 4½ feet above the ground. As 95 percent of the trees are infected with blister rust, the paint markings show up in a striking manner. Dead and dying trees are conspicuous throughout the 3-acre tract. The infection in this area was caused by wild gooseberries. Conspicuous near the entrance is a large sign indicating "Demonstration of Blister Rust Damage--Cooperation Maine Forest Service and the Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture." Another sign, somewhat back in the woods, shows the amount of infection and designates the meaning of the painted bands. Hundreds of people visit the demonstration, and many give their names and addresses on cards and place them in a box provided especially for this purpose. Many persons request that their properties be inspected. Several favorable comments have also been made regarding the demonstration itself.

Scouting for blister rust in Yellowstone National Park.--The discovery in 1937 of Ribes infection in southwestern Montana, from the Bitterroot Valley to within 19 miles of Yellowstone Park, pointed toward the possible establishment of scattered pine infection centers in this general region. Scouting in September 1940 by sampling in drainages throughout the northern half of the park and adjacent areas failed to reveal evidence of such centers. Since only a relatively small part of the vast reserve was covered, it is still possible that small centers exist, possibly centers of few fruiting cankers or even those of cankers that did not fully mature in 3 years. One of the particularly interesting locations scouted was the place near the park where infected Ribes petiolare was found in 1937. Although two Pinus flexilis trees grow within 20 feet and many more in the near vicinity of this spot, no tree infection could be located.

Blister rust found on Ribes fasciculatum in Wisconsin.--Blister rust on Ribes fasciculatum Sieb. and Zucc. was found during the inspection of Ribes bushes on the University Farm at Madison, Wis. These plants were

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lightly infected with uredinia. No telial columns could be found even under a microscope. Unlike infection on most Ribes leaves, a distinct brick-red color on both sides of the leaf disclosed the infected portion of each leaf. These R. fasciculatum plants grew within 50 feet of R. nigrum plants heavily infected with telia. It is highly probable that no telia appeared on the R. fasciculatum because many of the uredinia were just beginning to break through the epidermis, that is, because the infection was too young.

COTTON INSECT INVESTIGATIONS

Orius insidiosus Say and other predators of cotton bollworm eggs.--Edward E. Ivy, at the Waco, Tex., laboratory, makes the following observations: "During the course of bollworm toxicity studies a number of bollworm moths were collected and placed in a large screen-wire cage set over 4 cotton plants. On September 1, it was noted that a large number of eggs had been deposited on the plants in this cage. Although no accurate count was made, 100 eggs were collected from the leaves, buds, and squares in about an hour; and since there were eggs on practically every leaf, and on the stems, as well as on the cage itself, it seems reasonable to estimate that there were at least 500 eggs in this cage. On September 5 a thorough search disclosed no viable eggs and only 3 worms. A large number of predaceous insects were present and many of the eggshells left adhering to the stems were collapsed as though sucked by predators. Orius insidiosus was most common, but there were large numbers of chrysopid larvae, coccinellid larvae and adults, and syrphid larvae. It is known that the eggs were fertile, as 81 percent of the eggs collected on September 1 hatched when placed in pill boxes and, of those which failed to hatch, fully half were found to contain a nymph of O. insidiosus which had accidentally been enclosed with the leaf and egg when placed in the box. It should be noted that these plants supported a large aphid population which, however, was being rapidly depleted by a fungus disease. On September 9 when the cage was again examined it was found that almost all the aphids had been killed by this disease. Consideration of all the known factors led to the conclusion that the eggs and young larvae of the bollworm had been destroyed by insects which, until the introduction of the bollworm eggs, were predaceous on aphids. It is thought that perhaps the decimation of the aphid population by the fungus had caused these predators to direct their attention to other food sources, resulting in almost complete elimination of a high potential bollworm infestation. The phenomenon of almost overnight disappearance of large numbers of bollworm eggs has been observed many times in the field. For instance, at the Waco laboratory in August 1939 an infestation of 72.3 eggs per 100 cotton tips declined in less than 48 hours to less than 12 eggs per 100 tips and no young worms could be found at the second examination. An experimental field at Waco in 1940 showed an average of 33.4 eggs per 100 tips on July 19. An inspection 6 days later showed only 4.5 eggs per 100 tips and practically no young worms. O. insidiosus nymphs and adults were confined in cages and glass jars with bollworm eggs with and without aphids. In the tests where aphids were present several were destroyed daily and about twice as many bollworm eggs hatched as where aphids were not availabl Also some of the Orius survived a dusting with nicotine-calcium arsenate that killed all the aphids and bollworm larvae. In other tests individual coccinellid adults and larvae and chrysopid larvae destroyed 10 bollworm eggs (or larvae as they hatched) in 2 to 3 days. Cage tests and insectary tests indicate that O. insidiosus, coccinellid larvae and adults, and Chrysopidae may account for failure of high bollworm egg depositions to develop into correspondingly high bollworm larval infestations under certain conditions. As a large aphid population seems to protect bollworm eggs from predators, there is a possibility that under conditions of high aphid infestation, with Orius and other predaceous insects present, at least partial bollworm control might be obtained by reducing the aphid population by insecticidal means."

Cryolites for control of boll weevil and their effect on leaf aphid population.--Field-plot tests were conducted by R. L. McGarr and assistants, at State College, Miss., this season with cryolites containing approximately 29 percent, 35 percent, and 89 percent Na_3AlF_6, for control of the boll weevil and to determine their effect on the aphid population, as compared with calcium arsenate. The first two mentioned cryolites were mixed with sulfur. Seven replications of each treatment were made on 1/20-acre plots arranged in randomized blocks. Five effective poison applications were made of each treatment between July 27 and August 24. The cryolites were applied at an average rate of 10 to 12 pounds and calcium arsenate 6 pounds per-acre application. Four infestation records for the boll weevil were made after dusting operations were begun by examining 100 squares for weevil punctures on the 4 center rows of each plot at each inspection. Three aphid infestation records were made in the plots after dusting was started by counting the number of aphids per square inch on 100 square inches of leaf area on the fourth leaf from the top of the plants on the 4 center rows at each inspection. The results are summarized in the following table.

Treatment	Squares punctured by: boll weevil	Aphids per square inch of leaf area: Maximum	Average
	Percent	Number	Number
Check	48.4	0.64	0.37
Cryolite, approx. 29% Na_3AlF_6 and sulfur	48.0	1.90	.82
Cryolite, approx. 35% Na_3AlF_6 and sulfur	42.5	2.40	1.01
Cryolite, approx. 89% Na_3AlF_6	27.7	6.33	2.63
Calcium arsenate	15.3	8.97	3.93

It will be noted from the table that the cryolite containing approximately 29 percent Na_3AlF_6 gave no control of the boll weevil; the cryolite containing approximately 35 percent Na_3AlF_6 gave very little control; and the cryolite containing approximately 89 percent Na_3AlF_6 was only about half as effective as calcium arsenate. It will also be seen that where the cryolite containing approximately 89% Na_3AlF_6 was used the aphid build-up approached that for the calcium arsenate, and that the increase in aphids following the use of the cryolite-sulfur mixtures was about in proportion to the quantity of sodium fluoaluminate contained in each.

Cotton varietal resistance to insect attack.--K. P. Ewing and C. R. Parencia report that the varietal-resistance tests at Waco and Port Lavaca, Tex., each showed, as in 1939, that the Stoneville 4A variety of cotton had the earliest and heaviest infestation of flea hoppers but at the same time this variety led the four varieties tested in production. At Port Lavaca, the average seasonal infestation of flea hoppers in the check plots, and the average gain in pounds of seed cotton per acre in the dusted over the untreated plots were as follows: 57.6 flea hoppers and 169.4 pounds gain in the Stoneville 4A variety; 32.3 flea hoppers and 61.7 pounds gain in the Lankart variety; 24.3 flea hoppers and 56.1 pounds gain in the Rogers Acala variety; and 18.0 flea hoppers and 23.3 pounds loss in the Shafter Acala. At Waco the highest average infestation in the check plots was 38.2 flea hoppers and the highest gain was 23.2 pounds in the Stoneville 4A variety. At Port Lavaca the average production of seed cotton per acre in the check and dusted plots of the four varieties was as follows: Stoneville 4A, 1,250.6 pounds; Rogers Acala, 1,016 pounds; Shafter Acala, 1,015.8 pounds; and Lankart, 1,000 pounds. At Waco the production was as follows: Stoneville 4A, 796.4 pounds; Rogers Acala, 724.5 pounds; Shafter Acala, 641.9 pounds; and Lankart, 588.6 pounds.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Cotton stalk destruction.--Field clean-up has been conducted in the south Texas area and the lower Rio Grande Valley of Mexico during the last few years immediately after the picking of the cotton crop, as one of the principal measures for the control of the pink bollworm. Destruction of 1940 cotton stalks got well under way in the lower valley of Texas during the first half of September and unprecedented progress was made in this work during the latter half of the month. By the end of September stalks had been plowed out on 210,000 acres, leaving 10,000 acres to be destroyed. Of this undestroyed acreage, extensions had been granted on approximately 4,000 acres, and the remainder, on which unavoidable delays had been encountered, consisted principally of acreage owned by out-of-State residents. At the end of the period, however, arrangements had been made whereby nearly all of this acreage would be placed in compliance shortly after the first of October, which is the dead-line date for that area. As a rule wholehearted cooperation has been given by each individual farmer, and it is believed a more thorough and complete job of stalk destruction has never been done under the voluntary system. Excellent progress has also been made in the stalk destruction work in all areas under regulation in Mexico, and it was expected that the job would be completed in that area soon after October 1. Field clean-up operations began in a general way in the Coastal Bend district of south Texas about the middle of September, and at the close of the period stalks had been destroyed on approximately 70,750 of the 219,000 acres planted. Weather conditions throughout the year have been very unfavorable for the development of the cotton crop in that area, therefore yield is reduced and maturity of the crop irregular in many communities, resulting in an extreme shortage of labor for harvesting the cotton. Petitions from various sections were being forwarded to the Commissioner of Agriculture around the close of the period requesting that the dead-line date of October 15 be extended.

Vehicular inspection.--Road stations or patrols are conducted on the principal highways leading out of the various regulated areas during the most appropriate periods of the season to prevent the movement of uncertified cotton and cotton products. As the cotton season is drawing to a close in the lower Rio Grande Valley, the Falfurrias road station, which has been operated in that area by this Division since July 16, was turned over to the Division of Mexican Fruitfly Control at the end of September. During the month 15,160 vehicles were checked through the station and 621 confiscations were made, consisting principally of seed cotton taken from pick sacks, pillows, and mattresses. Of the 4,694 pick sacks checked, 3,680 contained some seed cotton. Owing to the fact that there has been such a great reduction in pink bollworm infestation in the Big Bend, it is not considered necessary to operate a road station in that area this season, as has been the custom in past years. However, one inspector has been assigned to patrol duties on the Marfa, Tex., highway during the short time pickers may be leaving that area. No interception of contraband material was made by this patrol during the 2-week period of operation in September. Three road patrol units operated in the Panhandle district during the period. Seed in that area is not sterilized as ginned, and there is considerable movement at this time of cottonseed from gins to oil mills for sterilization for movement outside of the area.

Wild-cotton eradication.--Efforts have been under way for a number of years to eradicate the pink bollworm from southern Florida through the destruction of wild cotton, which serves as a host to this insect. Field operations in that area are usually discontinued from about July 1 until the middle of September on account of unfavorable conditions. Eradication was inaugurated for the present season on September 23, with 10 W. P. A. workers. Requisition has been made to the Works Progress Administration for a total of 90 workers for the Bureau-sponsored wild-cotton eradication project, and through excellent cooperation on the part of officials of that agency our quota had been almost filled at the end of the period. Work was begun this season on Upper Matecumbe Key, but by the end of the month operations were being conducted in practically all areas where wild cotton had previously grown for the purpose of removing any seedling or sprout plants which may have developed since last season. Comparatively few plants were found during the period worked. Very little rainfall occurred in southern Florida during the summer months, and the so-called rainy season did not materialize this season until September. However, during September the rainfall was exceptionally heavy, and a greater number of seedlings may be encountered later than are being found at present. This is all to the advantage of the project, however, because the late development of wild cotton plants results in our being able to get back in the field before the plants mature fruit.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Dusts made from nuts of California buckeye toxic to Mexican bean beetle.--A series of small-scale tests conducted at the Columbus, Ohio, laboratory by J. W. Apple and N. F. Howard have shown that flours made from the meat or hulls of nuts of California buckeye (Aesculus californica) are toxic to laboratory-reared larvae and adults of Epilachna varivestis Muls., when applied to bean foliage. All feeding tests were conducted under a constant temperature of 85° F. and a relative humidity of 50 percent. The following table summarizes a portion of the results obtained.

Source of California buckeye flour	Insect stage	Quantity of dust applied in chamber	Average length of life after start of experiment	Average daily consumption of bean foliage per insect
		Mg.	Days	Sq. mm.
Hulls	Adult	500	3.0	178
Meat	do.	500	3.0	191
Do	do.	100	4.3	303
Do	do.	20	14.0	188
Do	do.	10	10.5	237
Untreated	do.	--	(1)	555
Hulls	Second instar	500	3.0	34
Untreated	do.	--	(2)	150
Meat	Newly hatched	100	2.0	11
Untreated	do.	--	(2)	58
Meat	do.	20	5.2	37
Untreated	do.	--	(2)	138
Meat	Third instar	10	22.3	102
Untreated	do.	--	(2)	127

[1] These adults were living at conclusion of tests.

[2] Most of these larvae pupated and emerged or were living at conclusion of tests.

While the data show that neither the meat nor hull flour are violent poisons, at small dosages over an extended period they do produce mortality. In all cases the amount of foliage eaten per unit of time was much less when the leaves were dusted than when untreated leaves were fed. This reduced feeding on treated leaves was concluded as not resulting from repellency of the insecticide because when either the adult beetles or the larvae were given an equal choice for feeding there was no significant difference in the amount of foliage eaten on treated and untreated parts of a leaf. Other data obtained in the course of these studies showed that female bean beetles lay very few eggs while feeding on foliage dusted with meat or hull flour; however, fewer eggs were laid by females feeding on the meat flour than by those feeding on the hull flour. The viability of eggs produced by poison-eating females was found to be no different from the viability of eggs from beetles fed untreated foliage. Larvae that were fed sublethal dosages of the meat or hull flours formed pupae that possessed rather abnormal wing buds. Instead of lying close to the body the buds extended at right angles from the thoracic region. Only a few adults emerged from such pupae and all but one of these died soon after emergence. These adults also had misshapen wings. Rather definite evidence was obtained showing that alcohol removes some of the toxic ingredient from the meat flour and the hull flour. However, the marcs did retard larval development, which might have been a result of some of the toxic ingredient remaining in the dust.

Tests with California buckeye flour against ants.--In one small-scale test Messrs. Apple and Howard found that flour made from the meat of California buckeye nuts apparently had no effect upon a colony of the ant Formica pallidefulva schaufussi var. incerta Em. when such flour was dusted on the soil about the nest, being replenished after each rain for a period of 43 days. In another test they found that neither the meat flour nor the alcoholic extracts of the meat and hull flours had any apparent toxic effect on two species of ants in their nests when they were fed these materials mixed with honey for a period of 37 days. The treatments tested were 1 percent meat flour in honey, 10 percent meat flour in honey, the extract from 1 gram of meat flour and 9 grams of honey, and the extract of 1 gram of hull flour in 9 grams of honey. The species used in the latter test were Lasius niger (L.) var.. and Prenolepis imparis (Say).

Longevity of beet leafhopper on tomatoes influenced by hairiness ~~of~~ plant-From a series of experiments conducted by E. W. Davis at the Modesto, Calif., laboratory, it was determined that nonviruliferous adults of Eutettix tenellus (Bak.) live longer when confined in cages on a variety of hairless tomatoes than in cages on varieties having long heavy hairs. All leafhoppers used in the experiments were as nearly comparable as possible in all respects, having been reared on beets free of the curly top disease and selected at random from mixed groups, all of which had been adults for about 7 days. The leafhoppers were confined in cages made of celluloid and strainer cloth, fastened so as to contain a branch of potted tomato plants of about the same age, and daily examinations were made for removing the dead insects. Records showed that, although the mean longevity of female leafhoppers on the 16 varieties of tomatoes tested formed a fairly uniform sequence between the highest and lowest, the mean longevity for female leafhoppers on a hairless variety was 7.75 days, whereas on a variety and 2 hybrids from it, having long heavy hairs, the means were 4.04, 3.34, and 4.36 days, respectively.

INSECTS AFFECTING MAN AND ANIMALS

Reaction of Clear Lake gnats to light intensity and color.--The effectiveness of different lamp intensities in trap catches were studied by A. W. Lindquist at the Nice, Calif., laboratory. Lamps of 100-, 300-, and 500-watt capacity were tested in traps as to their respective lumen and watt ratings. The grams of gnats taken per watt totaled 97.7, 58.7, and 47.9, respectively. In the same sequence the grams of gnats taken per lumen was 6.0, 3.0, and 2.4. It is indicated that, as the intensity of the light increases, a decrease of gnats per unit of light occurs. The larger lamps having more units of light take larger catches. Of the total gnats taken, the 100-watt lamp took 18.8 percent, the 300-watt 34.3 percent, and the 500-watt 46.3 percent. The 500-watt lamp, using five times the energy of the 100-watt lamp, took only slightly more than 2-1/3 times the amount of gnats. The 300-watt lamp, using three times the energy, took 1-3/4 times the amount of gnats taken by the 100-watt lamp. The increased cost of operation of a 300- and 500-watt lamp is probably justified by the increase in catch. Daylight fluorescent lamps, which have a low wattage but high lumen rating (15 watts - 450 lumens), took 737 grams gnats per watt, whereas a 50-watt Mazda took 59 grams per watt. In a series of tests using fluorescent white, green, red, pink, and blue, the daylight lamps always took more gnats per watt, but necessarily more per lumen. The blue lamp took more gnats per lumen and it appears that a color response is in effect.

Burning as an ovicide in control of Clear Lake gnats.--Mr. Lindquist and C. C. Deonier, Nice, have conducted control tests against the Clear Lake gnat which involve the burning of the eggs by gasoline sprayed on the water. By using a 3-gallon hand-pressure sprayer with a nozzle emitting a straight, clean stream, it was found that the gasoline on the water could be ignited and a stream of gasoline moved around over the water. The fire did not follow up the stream, but would race along the water wherever the stream was pointed. Excellent coverage was quickly accomplished on small areas. It was with considerable trepidation that this was tried from a boat out in the lake, but it was remarkably safe and easy, in fact safer than utilizing the sprayer from shore. In 18 tests it was found that the kill of eggs was nearly perfect. The method offers a means of egg destruction in that it is quick, positive, and probably cheaper than chemicals. Preliminary tests indicate that from 25 to 40 gallons per acre will be effective.

Breeding places of dog fly in northwest Florida.--W. E. Dove and Samuel W. Simmons report they have definitely determined the principal breeding places of the dog fly, so that the Bureau now has a basis on which to develop measures for control of the pest. Intensive and extensive observations were made by five experienced entomologists on the coast of northwest Florida during the principal breeding season for the flies. It was learned that most of the breeding this season occurred in tidal deposits of *Thalassia* and *Halodule*, two species of marine grasses. *Stomoxys calcitrans* (L.) deposited eggs on rows of these salt grasses in nature. The eggs hatched within about 1 day but the young larvae did not make rapid growth. The inundations of media by tidewater for 7 hours did not kill the larvae, but repeated submergence by the tides either killed the larvae or preserved the grass so as to prevent it from undergoing fermentation, thereby preventing growth of the larvae. In order to rear larvae in sufficient numbers for larvicide tests, it has been necessary to transport the grasses to locations not affected by tidal action. The matter of delimiting and treating breeding areas is encouraging. The following statements can be made: (1) Control of breeding during the months of July, August, and September would give sufficient protection for the entire season. (2) Breeding is confined to the shores of inner bays and sounds where two species of marine grasses are deposited by tides. A sea alga, *Sargassum*, may sometimes occur in quantities sufficient for development of fly larvae, but it was not encountered this season. (3) Only portions of shores of inner bays and sounds receive the grass deposits and these depend upon quantities of growing mosses in the bays, the direction and intensity of winds, and the force of high tides. (4) Of the shore lines receiving deposits of marine grasses, artificial control will be necessary only for deposits above the high-tide line, because the grasses prevented from normal fermentation by tides are not favorable for development of fly larvae.

(5) The early windrows deposited by ordinary daily tides, not storm tides, form a barrier against fresh deposits of green grass and tend to keep the latter near the water's edge, where they are submerged by salt water of subsequent daily tides. The high tides of the equinox of September repeatedly covered the new deposits of grasses and prevented development of larvae. (6) Control of dog fly breeding is primarily a question of taking full advantage of natural control, and it is going to require trained scouts to advise exactly when and where chemical treatment will be necessary. (7) Chemical tests for treatment of infested and fermenting grass deposits are encouraging, the principal difficulty being the matter of obtaining penetration to the bottom of the grass deposits.

Inspection of C. C. C. ditches in Delaware.--During the last days of September, G.H. Bradley and H. H. Stage made an inspection of the ditches dug in Delaware by the C. C. C. in 1936-38 as a mosquito-control measure. These ditches are maintained by the State through a biennial appropriation of $25,000.

Concentration of salt-marsh mosquito eggs.--A total of 2,015 soil samples have been flooded by G. H. Bradley and B. V. Travis, of the New Smyrna, Fla., laboratory, to obtain the distribution and abundance of mosquito eggs in salt marshes of Florida. The number of larvae hatching from these samples indicate densities up to nearly 2,000,000 per acre. The greatest concentration of eggs was found around the margins of ponds.

Immunity tests for salt-marsh mosquito bites.--No immunity to irritation has been observed by Messrs. Bradley and Travis, after approximately 1,500 mosquito bites on the right forearm in 1939 and 1,200 on the same area in 1940. Their records show that some people may be three times more attractive to salt-marsh *Aedes* than are others.

Dog filaria development in salt-marsh mosquito.--Mr. Travis reports feeding several adults of *Aedes taeniorhynchus* Wied. on a dog that was heavily infested with heartworm. The mosquitoes were later dissected to determine whether this species is a suitable developmental host for dog filaria. In a mosquito dissected 2 hours after feeding, 15 microfilaria were in the stomach and 69 in the malpighian tubes.

Comparative resistance of mosquito species to chemicals.--In comparative tests conducted by W. V. King at the Orlando, Fla., laboratory, reared *Aedes aegypti* (L.) larvae appeared more resistant to phenothiazine and certain azo compounds than did the stock larvae of *Culex quinquefasciatus* Say. Larvae of field-collected *Psorophora columbiae* D. & K. were found to be much more susceptible to these chemicals than were similarly treated, laboratory-reared *Culex* larvae.

Longevity of sand fly larvae.--J. B. Hull, of the St. Lucie, Fla., laboratory, reports that adult flies have emerged for 148 days from the time of collecting rearing samples. The shortest period of time for such larvae to emerge as adults was 63 days.

Control of American dog tick by dipping dogs.--After three complete seasons of a systematic dipping of all dogs in an area in Vineyard Haven, Mass., Carroll N. Smith reports the degree of its effectiveness is still uncertain. In a locality where the control of ticks was undertaken by means of eradicating meadow mice, Mr. Smith states that the adult tick population remained very low throughout the period June to September.

Trapping horn flies.--According to W. G. Bruce, of the Dallas, Tex., laboratory, horn flies cease to be a problem when the owners are compelled to use a cattle-fly trap daily. Mr. Bruce states this has been clearly demonstrated on the McFarland ranch at Cresson, Tex., where a cattle-fly trap is now in operation for the fourth consecutive year.

FOREIGN PLANT QUARANTINES

Regular passengers.--During the last three Sundays in August the plane inspector at Brownsville intercepted living larvae of Anastrepha ludens (Loew) each Sunday in oranges in stores from Mexico.

Pink bollworm larvae in cotton from Hawaii.--Three cotton bolls found in the suitcase of a passenger returning from Hawaii were found at San Francisco to be generally infested with live larvae of the pink bollworm (Pectinophora gossypiella (Saund.)) and were immediately destroyed.

Chinese chestnuts infested with termites.--A basket of waterchestnuts arriving at San Francisco recently in cargo from China was found on inspection to be heavily infested with termites representing a complete colony of the Formosan species, Coptotermes formosanus Shir., one of the most serious species found in the Orient and one not known to occur in this country. Under an option elected by the owner the case and contents were immediately destroyed.

Dutch elm disease in crate.--Elm has been found to make up a part of the wood used in open crates, for dishes especially, coming from England. At New York from 7 to 8 percent of these crates are made from elm, in part at least. Rodney P. True, of the forest pathology field laboratory, Morristown, N. J., wrote on September 30, confirming the presence of Ceratostomella ulmi (Schwarz) Buisman in a piece of crate from England intercepted in New York during August and found to show suspicious discolration.

California rust records.--"Hosts for Pucciniastrum ericae in America" is the title of a short paper by W. W. Diehl in the Plant Disease Reporter (24: 373, Oct. 1, 1940). This paper is based on collections made in Golden Gate Park and sent in by the San Francisco office. A specimen of Melampsoridium betulinum (Pers.) Kleb. on Betula japonica was sent at the same time. Arthur's Manual does not list this rust south of Washington and Montana.

Flag smut in Washington.--The recent discovery of flag smut of wheat (Urocystis tritici Koern.) near Goldendale, Wash., is reported by F. D. Heald and C. S. Holton in the Plant Disease Reporter (24:382, Oct. 15, 1940). The extent of the infected area and the source of infection materia are unknown. It is expected that greenhouse tests will be made to determine whether or not the fungus in Washington belongs to the same race as that in Illinois, Kansas, and Missouri.

Entomological interceptions of interest.--Two living larvae of the trypetid Anastrepha suspensa (Loew) were intercepted at New York on August 22, 1940, in guava in baggage from Puerto Rico. The coccid Epidiaspis piricola (del Guer.) was taken at the Inspection House at Washington, D. C., on May 1, 1940, on pear tree in express from Switzerland. A larva of the pink bollworm (Pectinophora gossypiella (Saund.)) was found at New York on August 6, 1940, in cottonseed in raw cotton used as packing in mail from India. One living adult and a pupal case of the tortricid Homona menicana (Wlk.) were taken at New York on July 31, 1940, on a ginkgo tree in quarters from Japan. One living adult of the scolytid Renocis mexicanus Blkm. was taken at Nogales, Ariz., in a wooden crate in cargo from Mexico. A living adult of the cerambycid Neoclytus rufus Oliv. was found at New York on September 11, 1940, in wood in dunnage from Trinidad. One living larva of the olethreutid Epinotia opposita Hein. was intercepted at Laredo, Tex., on August 21, 1940, in green string bean in baggage from Mexico. A living specimen of the lygaeid Lygaeus circumlitus Stal was found at El Paso, Tex., on August 31, 1940, on cut flowers in baggage from Mexico. Living adults of the bostrichid Micrapate scapularis Gorh. were intercepted at New York on August 27, 1940, in elder stems used for crating from Mexico. A living adult of the lygaeid Nysius expressus Dist. was intercepted at Seattle, Wash., on August 29, 1940, on cabbage in stores from Japan. A living adult of the neidid Aknisus multispinus (Ashm.) was taken at El Paso, Tex., on August 12, 1940, on mustard in cargo from Mexico. An adult of the lygaeid Gastrodes pacificus (Prov.) was taken on dry pine cones in baggage from Canada at Blaine on September 20, 1940.

Pathological interceptions of interest.--Citrus canker (Bacterium citri (Hasse) Doidge) was intercepted on sour limes from the Philippine Islands on September 16 at Baltimore. Tobacco in a parcel-post package from Canada and inspected at Boston on December 26, 1939, was affected by what the tobacco-disease specialist says are almost certainly spots of "wild fire," Bacterium tabacum Wolf & A. C. Foster. The banana leaf spot (Cercospora musae Zimm.) has been found on banana leaves several times at Galveston recently, including cargo from Costa Rica on September 12. An avocado from Mexico intercepted on September 18 at Laredo was found to have numerous small spots developing. Cercospora sp. was beginning to sporulate on a few of the older lesions. Although the symptoms did not agree with those described for avocado blotch (Florida Bul. No. 161), it might be the same fungus. Cercosporina rhododendri (Ferr.) Sacc., which may prove to be synonymous with Cercospora rhododendri March & Verpl., was intercepted on rhododendrons from Canada on February 17 and March 29 at Seattle. Colletotrichum incarnatum Zimm. was found on a cacao bean pod from Cuba on August 5 at Miami. Colletotrichum sp. and Physalospora sp. (no species of either genus reported on the host) were intercepted on Cyclanthus sp. in cargo from Guatemala on February 29 at San Francisco. Coryneum beijerinckii Oud. was found on peaches in baggage from Mexico on September 14 at Laredo. Diplodia henriquessiana Trav. & Spessa was intercepted at New York on August 29 on orchid plants in baggage from Chile. Gloeosporium cinctum B. & C. was found on August 7 at San Francisco on Dendrobium atroviolaceum and D. spectabile from Australia and on Odontoglossum sp. from Mexico, also on August 7, at Laredo. Phyllosticta sp. was found on July 19 at Brownsville on crapemyrtle from Mexico. Although the spores do not agree with the description it may be the rare P. lagerstroemiae E. & E. Phyllosticta sp. (unlike any species reported on orchids) was found on July 5 at Hoboken on *Cypripedium* sp. from England. The same fungus was found on varieties of *Cypripedium* from England on June 17 at San Francisco. *Sclerotium orchidearum* P. Henn. was found on orchids of the genera *Epidendrum*, *Notylia*, *Pleurothallis*, *Sobralia*, and *Stelis* and through the packing in a mail shipment from Costa Rica inspected on July 5 at San Francisco.

DOMESTIC PLANT QUARANTINES

Swain discovers parasite of white-fringed beetle.--Specimens of nematodes, reported in the vicinity of Gulfport, Miss., found to be parasitizing larvae and adults of the white-fringed beetle, have been identified by the Office of Nematology of the Bureau of Plant Industry as *Diplogaster* (new species). Plans are under way, in cooperation with the Division of Cereal and Forage Insect Investigations, to conduct a survey throughout the areas infested by the white-fringed beetle in Alabama, Florida, Mississippi, and Louisiana, to determine whether this parasitic nematode is present and to gather information relative to its effectiveness as a natural means of control of the beetle. The discovery of this apparently new species of nematode was a result of observations made by Ralph B. Swain, of the white-fringed beetle control project. In the fall of 1939 unusually heavy infestations of the white-fringed beetle larvae were present in one field in the Gulfport area. In the spring of 1940 the number of larvae had decreased to an extent far below that normally caused by winter mortality or the cavernous habits of the pest. It was also noted during the late spring and early summer months that there was little adult emergence from this area. In an endeavor to determine the cause for the decided reduction in beetle population, Dr. Swain carefully examined specimens of adults and larvae and noted that they were heavily infested with nematodes. It is hoped that the result of the survey to be conducted this fall, together with subsequent cooperative work during the spring and summer months, will yield more specific information as to the part that this new species of nematode may play in controlling the white-fringed beetle.

Other white-fringed beetle control activities.--Control operations for the white-fringed beetle were brought to a close in September, after which the field equipment was cleaned and placed in storage. Personnel reductions were gradually effected during the month as the various phases of the work were completed in the different areas. Regulatory activity increased during the month as the harvesting of restricted farm products progressed. Cotton ginning was nearing completion by the end of the month and haying and peanut picking were well under way. Increases were also noted in the number of potted plants and restricted construction materials. W. P. A. projects continued in operation in Alabama, Florida, and Mississippi assisting in control operations, in addition to carrying on clearing work throughout the month.

Mole cricket control operations in Florida.--In response to recent urgent requests on the part of plant growers in the vicinity of Plant City, Fla., and several other areas in the State, for Federal assistance in the control of emergency outbreaks of the mole cricket, bait materials for these pests are being supplied through the use of funds from the appropriations made for the control of emergency and incipient outbreaks of insect pests and plant diseases. Severe damage by the imported mole cricket, *Scapteriscus* spp., has occurred to field and vegetable crops, particularly strawberry and other transplanted crops, the infestation in the entire eastern section of Hillsborough County involving 20,000 acres of cultivated crops including 3,500 acres of strawberry. Truck-growing areas in five other counties in the State have been reported as heavily infested. Growers for the last several seasons have, with State assistance, applied control measures in the more severely infested areas, but are now faced with an acute situation because of crop losses of the past winter and other economic conditions in the Plant City area. The control of the pest is recognized as a community project because of the general widespread infestation in cultivated areas and adjacent lands. The State will continue to contribute to the effort. Applications are investigated on the basis of conditions obtaining and work projects are cleared through a State mole cricket control committee composed of representatives of the Commissioner of Agriculture, the Extension Service, and the State Plant Board. Agreements have been entered into with the counties of Hillsborough, Hardee, Lake, Manatee, Pinellas, and Polk, under which the counties will assume sole responsibility for possible claims for damages arising from the use of poisoned bait. Six hundred tons of bait materials had been delivered at Plant City and 600 additional tons purchased the latter part of September. H. T. Rainwater, who assisted in conducting the Bureau field activities in the chinch bug control operations last summer, is in field charge of the mole cricket project, with headquarters at Plant Hotel, Plant City.

Grasshopper survey.--The grasshopper egg survey continued through the latter part of September and into October with preliminary indications of a general downward trend in the possibilities for widespread infestations in 1941. It is anticipated that the egg survey will be completed by the middle of October except in special areas where egg laying has been prolonged owing to geographical location or to development of second-generation Melanoplus mexicanus in sections of the Southern Great Plains. In the latter area it has been necessary to delay the survey in order to permit more accurate estimates of egg laying.

Fall development of grasshoppers.--In southwestern Kansas, southeastern Colorado, and the panhandles of Texas and Oklahoma second-generation M. mexicanus developed relatively heavy populations of adults in mid-September. This outbreak reached sufficient proportions to induce migrations which spread over considerable areas north and east into Kansas. Farmers evidenced widespread interest in fall baiting for the protection of winter wheat and late crops. Bait materials were furnished in considerable quantity from nearby areas where surplus materials had been stored for winter and on latest reports were still being used rather extensively.

Field headquarters for peach project moved.--The project leader and those concerned with the field supervision of the activities of the phony peach and peach mosaic disease control projects were established early in September at San Antonio, Tex., with new headquarters at the post-office building. That part of the personnel concerned with business administration remains for the present at the former headquarters at Little Rock, Ark.

Fall activity on peach disease control.--Predefoliation inspection of nursery stock in the peach mosaic infected areas was completed during

September and the first few days of October. Infection was found in the stock of two Texas nurseries resulting in the complete destruction under State authority of the stock in one nursery. Consideration is being given to the disposal of the stock in the other nursery. All orchard inspection in the phony peach area has been completed except in Alabama, Georgia, Louisiana, and Texas. Inspection of orchards in the peach mosaic areas was completed earlier in the season.

Peach tree removal work.--The removal of escaped, abandoned, and diseased trees continued in Alabama, Arizona, Arkansas, California, Colorado, Georgia, New Mexico, South Carolina, Tennessee, Texas, and Utah, with the employment of 454 relief laborers. The removal of diseased trees in California constituted the high light of this activity where emergency relief funds became available on September 10. In the subsequent 11-day period over 1,700 infected trees were removed. There remained, however, approximately 16,000 infected trees to be destroyed and work to that end is progressing as rapidly as possible. Grower cooperation in California continues to improve as indicated by the number of waivers obtained.

Sweetpotato weevil control activities.--Surveys conducted during September in Alabama failed to reveal any sweetpotato weevil infestations on properties inspected, which comprised a total of 739. This inspection work was confined for the most part to areas in Mobile and Baldwin Counties, where control activities are under way. In these counties the extensive planting of soybeans following the sweetpotato crop is proving to be of material assistance in eliminating volunteer sweetpotato plants. In Georgia inspections on 416 properties in Thomas, Colquitt, and Charlton Counties were made and no infestations were found. In Mississippi 548 properties were inspected during the month and only 4 infestations of the sweetpotato weevil were found. According to reports, it is expected that the Starch Plant at Laurel, Miss., will begin operations in October and will use 200,000 bushels of sweetpotatoes. In Texas inspection work was conducted in Nacogdoches and Cherokee Counties with negative results. Reports indicate that the sweetpotato crop in that part of the State will exceed that of recent years. At the request of the Louisiana State Entomologist, cooperative Federal-State inspection activities were conducted during the month in 19 parishes. A total of 1,026 property inspections have failed to locate any infestation. The area in which the survey is being conducted comprises important sweetpotato-producing areas in the northern part of the State. The survey will be continued in October.

Transit-inspection conference at Gulfport, Miss.--The transit inspectors of the Southern States region held a meeting with the regulatory inspectors of the white-fringed beetle project at Gulfport, Miss., on September 16 and 17, permitting a thorough discussion of the white-fringed beetle quarantine regulatory problems in which the transit inspectors of the Southern States are primarily interested. Regulatory problems in regard to the sweetpotato weevil State quarantines and the standard State quarantines on account of phony peach and peach mosaic were also discussed. The meeting was also attended by representatives of the sweetpotato weevil project and by the State inspector in charge of transit inspection at Jacksonville, Fla. The inspector in charge of the Southern States region proceeded to Houston, Tex., after the meeting, to make a study of that station in regard to its importance as to transit inspection.

Fall activities on transit inspection.--Transit inspection was resumed at Birmingham and Memphis, and an additional inspector was assigned to the Atlanta station. Arrangements have been made at all southern stations for freight clerks to make notations on train sheets as to the presence of Federal certificates attached to waybills covering quarantined material. An inspector was transferred from Pittsburgh to Washington to assist in the enforcement of regulations pertaining to plants entering the District of Columbia, as well as Federal quarantine regulations, and the Pittsburgh vacancy was filled by a man assigned by the Japanese beetle control project which also assigned an additional inspector to New York City.

Some observations at transit-inspection points.--The inspector at Omaha, Nebr., advises of the establishment of a barge line running from New Orleans to Sioux City, Iowa, which is the first since 1850 that the Missouri River has been opened for navigation as far as Sioux City. The inspector at Boston advises that greatly increased freight movement has necessitated the increase of personnel at freight stations and that freight foremen are making every effort to acquaint the new employees with quarantine regulations so that quarantined material will be set aside for inspection. A gradual increase in nursery stock movement toward the latter part of the month was noted at all stations. Two hundred and thirty-eight violations were intercepted during the month, 88 percent of which were of the Japanese beetle quarantine.

Citrus canker activities.--Several crews of W. P. A. employees are conducting tree-removal activities in the Houston, Tex., area to destroy *Citrus trifoliata* seedlings that have sprouted during the past year and to remove any wild host plants of the canker that may remain in this area. An intensive survey for the disease is also being made by trained inspectors in connection with tree removal.

CONTROL INVESTIGATIONS

Efficiency of methyl bromide fumigation in greenhouse increased.--H. H. Richardson and A. H. Casanges, of the Division of Control Investigations, and G. V. Johnson, of the Division of Truck Crop and Garden Insect Investigations, found that the dosage of methyl bromide could be reduced by approximately one-half in summer and still obtain high efficiency against the Mexican mealybug and the common red spider. Temperatures during fumigation were about the same as those present during winter and spring fumigations (69°-70° F.). Although the air convection currents present in the greenhouse during night fumigations in summer are much lower than those in winter and spring (the heating pipes were cold in summer and temperature differed only 2°-5° from outside), it was found that good distribution of the heavy methyl bromide gas took place in the small greenhouse with either the pan or spray method of vaporization.

INSECTICIDE INVESTIGATIONS

Methods for determining rotenone and total extract in derris and cube.--The first part of a review of methods for the evaluation of derris and cube roots has just been completed by H. A. Jones. This portion includes about 70 references on the determination of rotenone. In addition, methods for sampling the roots and for determining moisture and total extract are also reviewed and a brief statement of the methods of analysis at present in use in the trade is included. Later parts will review methods for determining other constituents of derris and cube, methods for their biological evaluation, and articles comparing chemical and biological methods of evaluation.

A new device for compacting powders.--An outgrowth of the particle-size work by E. L. Gooden is a new method of compacting powders. This method was developed particularly for use with the self-calculating air-permeation machine for measuring surface mean diameter. With some of the finest insecticidal powders the older means of compaction were inadequate. In the new method a hand tool of simple design is used to build up within the sample tube a column of any desired height, the compacting process proceeding from bottom to top concurrently with the deposition of the material. The operation is completed in about 5 minutes and only moderate care is required to produce practical uniformity of porosity. A manuscript describing the compactor and its performance has been prepared for publication, and a patent application has been filed.

Sodium arsenites--the system Na_2O-As_2O_3-H_2O.--O. A. Nelson has just presented for publication in the Journal of the American Chemical Society the results of an investigation into the three component system--Na_2O- As_2O_3 H_2O at 35° C. Over 7¼ million pounds of sodium arsenite is used annually by Federal and State agencies for the control of grasshoppers, Mormon crickets, and white-fringed beetles, but in spite of this very considerable consumption, the chemistry of this insecticide was only incompletely known. This investigation disclosed the existence of four sodium arsenites having formulas $Na_2O.3As_2O_3$; $Na_2O.As_2O_3$; $Na_4As_2O_5.7H_2O$ (or $Na_2HAsO_3.3H_2O$); and $2Na_2O.As_2O_3$, in addition to white arsenic (As_2O_3). Of these compounds $Na_2O.3As_2O_3$ and $Na_4As_2O_5.7H_2O$ have not been identified before. The commercial sodium arsenite powder containing 80-82 percent As_2O_3 is therefore a mixture of $Na_2O.As_2O_3$ and $Na_2O.3As_2O_3$, instead of the meta arsenite and white arsenic, as previously thought.

The vapor pressure of phenothiazine.--Phenothiazine when freshly applied is more toxic to codling moth larva than is lead arsenate at the same dosage; however, after a few days the deposit appears to lose much of its toxicity. This loss has been ascribed to a number of factors among which loss of material due to evaporation has been suggested. In order to determine whether the loss in toxicity was due to this factor, O. A. Nelson and L. E. Smith have determined the vapor pressure and rate of evaporation of phenothiazine at temperatures commonly met with under field conditions. The results of their experiments showed that at 40°, 50°, 60°, and 70° C. the vapor pressures were 3.17×10^{-6}; 10.4×10^{-6}; 3.14×10^{-5}; and 8.95×10^{-5} mm. of Hg, respectively, pressures much lower than those of most organic compounds (the vapor pressures of naphthalene and paradichlorobenzene at 35° C. are 0.21 and 2.3 mm. Hg, respectively). The rate of evaporation of phenothiazine dusted on glass plates at the rate of 200 micrograms per square centimeter was found to be 0.19 micrograms per square centimeter per hour, from which it follows that the loss was slightly less than 1 percent of the weight of the deposit over a period of 100 hours. From these data on vapor pressures and rate of evaporation of phenothiazine, it is evident that the loss in toxicity of this insecticide is not due to loss of material through evaporation or sublimation. A paper covering this investigation has been presented to the Journal of the American Chemical Society for publication.

BEE CULTURE

Dilution may improve attractiveness of cedar honeydew to bees.--George H. Vansell, Davis, Calif., states: "Cedar honeydew on the trees early in October gave a reading of 81 percent sugar on the refractometer. Bees returning to the hive had in their honey stomachs similar-appearing material which tested from 50 to 60 percent sugar. This suggests that bees may find this material difficult to work and therefore select that of lesser concentration or may add water to the very sticky honeydew in order to work it. Scale hive colonies on the cedar flow show daily gains of about 1 pound, but following rain there is an abrupt jump to 3 or 4 pounds. This increased yield declines to the former level after a couple of days. This suggests that dilution may improve the gathering of this material. The aroma of cedar honeydew is practically nil. This is quite different from many flower nectars such as orange, star-thistle, or clovers. Exposed blossom honey (which has an 80 percent sugar content) during a good nectar flow is usually not attractive to bees, but during a cedar flow bees are inclined to rob exposed honey. This indicates that aroma may be a factor in this response, since this has been particularly observed with thistle honey which carries a distinctive aroma. Combs wet with thistle nectar were most eagerly robbed when carried into cedar yards. From this it appears that the attractiveness to bees of a sugar solution may be partly due to aroma. There is ample evidence that nectars below 30 percent sugar are less attractive than those of 30 to 60 percent, but perhaps sugar solutions with low aroma, even above this range, may be less attractive."

Spore-sirup method of inoculating colonies with American foulbrood.--S. E. McGregor reports that the spore-sirup method of inoculation, used successfully at the Laramie, Wyo., laboratory, has not been causing disease to develop satisfactorily at Hope. Five different methods of inoculation were used on 21 colonies headed by sister queens. These methods were: (1) 10 M.I.D. spore sirup--50,000,000 spores mixed in 1 quart of sugar sirup and fed to a colony; (2) 40 M.I.D. spore sirup--200,000,000 spores mixed in 1 quart of sugar sirup and fed to a colony; (3) 10 M.I.D. spray--50,000,000 spores mixed with 10 cc. sugar sirup and sprayed directly onto 1-day old larvae; (4) 10 M.I.D. pollen--50,000,000 spores in 10 cc. sugar sirup and 10 cc. pollen placed in cells in the brood nest; (5) comb insert--a piece of comb 1½ by 1-3/4 inches cut from a diseased hive and inserted in a frame of the test colony. The results were as follows:

Method	Colonies tested	Colonies that developed no disease	Colonies that developed disease	Colonies that failed to recover
	Number	Percent	Percent	Percent
Comb-insert------------	4	0	100	100
10 M.I.D. spore sirup--	6	83	17	17
40 M.I.D. spore sirup--	1	0	100	0
10 M.I.D. spray--------	5	40	60	0
10 M.I.D. in pollen----	5	100	0	0

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All of the comb-insert colonies developed disease beyond hope of recovery. One of the 10 M.I.D. spore-sirup colonies developed disease beyond hope of recovery. All of the other colonies either developed no disease or developed only light cases and promptly recovered.

A method developed for counting sperm in queenbee spermathecae.--Otto Mackensen, University, La., reports the development of a method for determining the number of sperm in the spermatheca of queenbees. The spermatheca is broken in 1 cc. of tap water, and the sperm dispersed by sucking the water in and out of an eye-dropper pipette. The volume is then increased to 4 cc. and the mixture again thoroughly agitated. The sperm in a 4 cc. sample are then counted with the aid of a haemocytometer and the total number of sperm calculated. Tap water has been found to be as satisfactory as several other diluents used. Good use is being made of this method in determining the effectiveness of various methods of artificial insemination.

IDENTIFICATION AND CLASSIFICATION OF INSECTS

Mass flight of a geometrid moth.--A large migration or undirectional flight of what was supposed to be the cabbage butterfly (Pieris rapae (L.)), was reported by George S. King, of Bay Shore, N. Y. The insects were said to occur in enormous swarms over Great South Bay, on the southern shore of Long Island. Specimens were later received from Dr. King and were found to be the geometrid Cingilia catenaria (Drury), the larvae of which are sometimes very abundant on blackberries, huckleberries, and blueberries. This appears to be the first report of such a mass flight of C. catenaria.

Workerlike males of a North American ant.--This Division recently received from W. W. Baker, of the Division of Truck Crop and Garden Insect Investigations, Puyallup, Wash., a very nice series of the ant Leptothorax diversipilosus M. R. Smith, which was collected at Spanaway, Wash., from the nest of the roof-thatching ant (Formica rufa subsp. obscuripes Forel). This Leptothorax is of more than usual interest in that it is the only known North American species of the genus possessing males that are so like the workers in appearance that they can be separated from the latter only by the most careful scrutiny. The species shows a striking similarity in both structure and habits to the European guest ant (Formicoxenus nitidulus Nyl.), which lives in the nests of Formica rufa L. and F. pratensis Retz.

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